Web Accessibility and Guidelines

Simon Harper and Yeliz Yesilada

Abstract Access to, and movement around, complex online environments, of which the World Wide Web (Web) is the most popular example, has long been considered an important and major issue in the Web design and usability field. The commonly used slang phrase 'surfing the Web' implies rapid and free access, pointing to its importance among designers and users alike. It has also been long established that this potentially complex and difficult access is further complicated, and becomes neither rapid nor free, if the user is disabled. There are millions of people who have disabilities that affect their use of the Web. Web accessibility aims to help these people to perceive, understand, navigate, and interact with, as well as contribute to, the Web, and thereby the society in general. This accessibility is, in part, facilitated by the Web Content Accessibility Guidelines (WCAG) currently moving from version one to two. These guidelines are intended to encourage designers to make sure their sites conform to specifications, and in that conformance enable the assistive technologies of disabled users to better interact with the page content. In this way, it was hoped that accessibility could be supported. While this is in part true, guidelines do not solve all problems and the new WCAG version two guidelines are surrounded by controversy and intrigue. This chapter aims to establish the published literature related to Web accessibility and Web accessibility guidelines, and discuss limitations of the current guidelines and future directions.

1 Introduction

Disabled people use assistive technologies, a term used to refer to hardware and software designed to facilitate the use of computers by people with disabilities (DRC 2004), to access the Web (see Assistive Technologies). These technologies work satisfactorily as long as the page is designed well. However, this is not the

S. Harper
Human Centred Web, School of Computer Science, University of Manchester, Manchester, M13 9PL, UK
e-mail: simon.harper@manchester.ac.uk

S. Harper, Y. Yesilada (eds.), *Web Accessibility*,
DOI: 10.1007/978-1-84800-050-6_6,

case for many pages (Takagi et al. 2007). The W3C Web Accessibility Initiative (WAI) recognises this and provides guidelines to promote accessibility on the Web including Web Content Accessibility Guidelines (WCAG 1.0) (Chisholm et al. 1999). While many organisations such as the RNIB (Royal National Institute of Blind People) also highlight some of the important accessibility issues, the W3C accessibility guidelines are more complete and cover the key points of all the others. Besides WCAG 1.0, the W3C also provides guidelines for user agents and authoring tools. However, as recent surveys demonstrate (DRC), few designers follow these guidelines.

Unfortunately, all attempts which have focused on guidelines have failed to give unilateral accessibility across the board because they are optional, not enforceable, and not accurately testable. While version two of the WCAG guidelines (not yet ratified by the W3C) promises to be more testable, with suggested routes to validation built in at the start, the guidelines still cover over 200 pages with an additional 200 page 'how-to' annex. In this case, it would seem that only the most dedicated designer will know enough to design to accessibility standards and produce pages which validate correctly. Indeed, because Web browsers present content on the screen, the visual rendering is often the only 'validity' check a designer or author performs. However, this check is flawed as most browsers attempt to correct badly written, and inaccessible, code as it is displayed. Therefore, although Web guidelines direct designers and authors to best practice, currently, most Web sites have accessibility barriers that make it either difficult or near impossible for many people with disabilities to use these sites.

There are also evaluation, validation, and repair tools (see Web Accessibility Evaluation) to check Web pages against best practice and guidelines. In brief, validation and repair tools analyse pages against accessibility guidelines and return a report or a rating (Ivory and Hearst 2001). These tools are important for Web accessibility as they provide a medium for designers or authors to validate their pages against published guidelines without actually reading and manually applying them (Paciello 2000). Although there has been extensive work in the degree and development of these tools, automation is still limited (Yesilada et al. 2004). While it is likely that there are certain accessibility issues that cannot be fully automated (e.g., checking the quality of alternative text provided for images), these tools still provide incomplete automation and complex outputs.

Similarly, there are also tools to transform Web pages into a more accessible form for disabled users (see Transcoding). Client-side rendering and transformation tools try to remould Web pages into user-centric presentations. This may either be in the form of a custom browser built to enhance the interaction of people with specific disabilities or as extensions to mainstream browsers or as proxies which modify Web documents as they are delivered to the user. However, most of these tools lack an understanding of disabled users' interaction with Web pages and their requirements. In order to address such user-requirement issues,

some effort has been directed towards improving the tool support for designers (see Authoring Tools) building accessibility support in at the source.

In this chapter, we will examine the published literature related to Web accessibility and Web accessibility guidelines and then discuss limitations of these guidelines and future directions. We begin by demonstrating why accessing and using Web content is a difficult task for disabled users and what has been accomplished through guidelines to improve this.

2 Overview

Web accessibility refers to the practice of making pages on the Web accessible to all users, especially to those with disabilities (Paciello 2000, Thatcher et al. 2002). Although an accessible Web means unprecedented access to information for people with disabilities, recent research suggests that the best practice on accessibility has not yet been achieved. For example, Kelly (2002) found the accessibility of the high street stores, banks, and universities in the UK extremely disappointing. Eva (2002) surveyed 20 'Flagship' governmental Web sites in the UK and concluded that 75% needed immediate attention in one area or another. The Disability Rights Commission (DRC) conducted an extensive user evaluation, whose report (DRC) concludes that most Web sites (81%) fail to satisfy even basic accessibility requirements.

The Web plays an increasingly important role in many areas (e.g., education, government), so an accessible Web that allows people with disabilities to actively participate in society is essential for equal opportunities in those areas. Furthermore, Web accessibility is not only a social issue but it is also becoming a legal requirement (Paciello 2000, Thatcher et al. 2002). Nations and continents including the UK, Australia, Canada, and the United States are approving specific legislation to enforce Web accessibility.

Web accessibility depends on several different components of Web development and interaction working together, including Web software (tools), Web developers (people) and content (e.g., type, size, complexity, etc.) (Chisholm and Henry 2005). The W3C Web Accessibility Initiative (WAI)[1] recognises these difficulties and provides guidelines for each of these interdependent components: (i) Authoring Tool Accessibility Guidelines (ATAG) which address software used to create Web sites (Treviranus et al. 2000); (ii) Web Content Accessibility Guidelines (WCAG) which address the information in a Web site, including text, images, forms, sounds, and so on (Chisholm et al. 1999); (iii) User Agent Accessibility Guidelines (UAAG) which address Web browsers and media players, and relate to assistive technologies (Gunderson and Jacobs 1999). There are also other organisations that provide accessibility guidelines such as RNIB (see Table 1) and also accessibility reports that suggest

[1] WAI, http://www.w3.org/WAI/

Table 1 Web accessibility guidelines

Organisation and guidelines	Website
WAI Guidelines	http://www.w3.org/WAI/
Section 508 Guidelines	http://www.section508.gov/
RNIB Guidelines	http://www.rnib.org.uk/
AFB Guidelines	http://www.afb.org/
Dive into Accessibility	http://www.diveintoaccessibility.org/
IBM Guidelines	http://www-306.ibm.com/able/guidelines/
PAS78	http://www.drc-gb.org/
Accessible PDF ad Flash	http://www.adobe.com/accessibility/

Table 2 Web accessibility evaluation surveys and reports

Organisation and guidelines	Reference
DRC Report	(DRC)
Nielsen Norman Group Report	(Coyne and Nielsen 2001)
Nova Report	(Craven and Brophy 2003)
eAccessibility – EU report	(rep 2005)
UK Government Web sites	(Eva 2002)

guidelines (see Table 2), but the WAI guidelines are more complete and cover the key points of all the others. There is however, no homogeneous set of guidelines that designers can easily follow. Moreover, some guidelines are tailored to address the limitations of existing assistive technologies and devices. For instance, there is a guideline which says that extra white space needs to be added between link menu elements as some screen readers, which are commonly used assistive technologies among visually disabled users to access Web pages in audio, cannot handle link menu items properly. This means that some of these guidelines are not generic and device independent.

The Web Content Accessibility Guidelines 1.0 (WCAG 1.0) describe how to make accessible Web content and Web sites (Chisholm et al. 1999). They are presented in two themes: graceful transformation (of content, structure, and presentation) and making content understandable and navigable (see Table 3). The specifications provide 14 guidelines, but unfortunately only three of them are in the second theme; the rest, such as creating tables that transform gracefully, are oriented to support sensory translation of text content to audio (Goble et al. 2000). The Nielson Norman Group has also published guidelines to assist designers to create accessible and usable Web pages (Coyne and Nielsen 2001). Although these guidelines are based on a series of usability tests of several different Web sites, the guidelines themselves are not different from others. Lately, the WAI is working on a new version of WCAG. However, this version has yet to be completed and published[2] (see Section 4.1). Furthermore, as the DRC report concludes, although

[2] WCAG 2.0, http://www.w3.org/TR/wcag2-req/

Table 3 Summary of the web content accessibility guidelines (WCAG 1.0)

No.	Guideline
Theme 1: Ensuring graceful transformation	
1.	Provide equivalent alternatives to auditory and visual content
2.	Do not rely on colour alone
3.	Use markup and style sheets and do so properly
4.	Clarify natural language usage
5.	Create tables that transform gracefully
6.	Ensure that pages featuring new technologies transform gracefully
7.	Ensure user control of time-sensitive content changes
8.	Ensure direct accessibility of embedded user interfaces
9.	Design for device independence
10.	Use interim solutions
11.	Use W3C technologies and guidelines
Theme 2: Making content understandable and navigable	
12.	Provide context and orientation information
13.	Provide clear navigation mechanisms
14.	Ensure that documents are clear and simple

the compliance with WCAG 1.0 is necessary, it is not a sufficient condition for ensuring that sites are practically accessible and usable by disabled people (DRC). The DRC report also provides a number of recommendations to improve the navigation and orientation issues addressed in WCAG 1.0.

The User Agent Accessibility Guidelines 1.0 (UAAG 1.0) describe how to make browsers and media players accessible (Gunderson and Jacobs 1999). The specification emphasises the importance of accessibility of the user interface, enabling the user to have access to the content and helping the user to orientate (see Desktop Browsers). Similarly, the Authoring Tool Accessibility Guidelines 1.0 (ATAG 1.0) provide key issues to assist in designing authoring tools that produce accessible Web content and assist in creating an accessible authoring interface (Treviranus et al. 2000). Most of the guidelines in this specification focus on the creation of standard and accessible markup, but they pay little attention to how authoring tools can assist Web designers to create understandable and navigable Web pages.

Besides these guidelines, there are also other best practice efforts (Yesilada et al. 2007), which mainly include developing tools to ensure accessibility, such as validation, transformation, and repair tools[3] (Harper and Bechhofer 2005). Validation and repair tools analyse pages against accessibility guidelines and return a report or a rating (Ivory and Hearst 2001). Various validation tools are available which differ in several ways such as functionalities (e.g., testing, fixing) and method of use (e.g., online service, desktop application integrated in authoring tools). These tools are important for Web accessibility as they provide a medium for designers or authors to validate their pages against

[3] Evaluation Tools, http://www.w3.org/WAI/ER/existingtools.html

published guidelines without actually reading and manually applying them (Paciello 2000). While these tools encourage markup that conforms to the specifications and guidelines, no one except the Web page designer can really enforce it. While the evaluation and repair tools focus on assisting the authors to modify or correct their pages, transformation or transcoding tools focus on assisting Web users by mainly transforming pages into alternative forms to better meet users' needs (see Transcoding). Although there has been extensive work in the degree and development of these tools, automation is still limited (Yesilada et al. 2004). While it is likely that there are certain accessibility issues that cannot be fully automated (e.g., checking the quality of alternative text provided for images), these tools still provide incomplete automation and complex outputs.

There are a number of related fields to Web accessibility and guidelines which serve as a generic expression of the kinds of requirements needed to make the Web open. Device independence encourages this openness by encouraging inclusively diverse devices. By supporting these devices in a generalised context, we provide de facto support for specialist devices, such as the assistive technologies used in Web accessibility. How users interact, and support for that interaction, is also very important in both the general case and in the specialised case of accessibility. Only by understanding both of these areas can we design Web accessibility guidelines and support open standards. Indeed, the more we reveal by our research, the more changes are required to the guidelines, hence the constant move through versions. In the following sections, we discuss a number of areas where we believe they will impact how Web accessibility guidelines will be developed in the future.

2.1 Device Independence

Device independence, the goal of running any Web resource on any compliant device, is as yet unachieved. However, the W3C has had a device independence activity[4] since these early noughties, which has now been closed and its work items transferred to the Ubiquitous Web Applications Activity (UWA).[5] Both activities, however, aim to develop techniques and recommendations to address challenges (Sullivan and Matson 2000) faced by Web users because of device or network limitations, including small screens, restricted keyboards, and lower bandwidth (Lie and Saarela 1999). This activity mainly focuses on methods by which the characteristics of the device are made available, and methods to assist authors in creating sites and applications that can support device independence. The most important outcome of this activity is the Composite Capabilities/Preferences Profile (CC/PP) which is a framework for describing device capabilities and user preferences.

[4] Device Independence Activity, http://www.w3.org/2001/di/

[5] Ubiquitous Web Applications Activity, http://www.w3.org/2007/uwa/

Although the CC/PP framework is based on the Resource Description Framework (RDF),[6] which means it provides an extensible vocabulary (descriptions of new devices and different user preferences can easily be represented), there are many limitations. For example, such device descriptions require negotiation between server and client, because the server needs to provide content to meet the needs of the client device. This requires designing pages in such a way that numerous device and profile descriptions can be handled on the server side (Dees 2004). This can be achieved either by applying content selection techniques or content transformation algorithms. However, the method is not as important as the fact that designers need to design pages in such a way that these different requirements can be handled. Furthermore, if designers also want to create accessible pages for disabled users, they need to consider accessibility requirements as well as device independence requirements (Kirda 2001), which means that page design can become extremely complicated.

With the transfer of concerns to the new UWA Activity, we may see 'über–device independence' as the working group re-focuses on extending the Web to all kinds of devices including sensors and effectors, with application areas including home monitoring and control, home entertainment, office equipment, mobile and automotive applications.

2.2 Web Interaction

Web interaction focuses on improving technologies that provide communication with the Web. This is lead by the W3C's Interaction Domain, which is responsible for developing technologies that shape and adapt the Web's user interface (Sullivan and Matson 2000).[7] These technologies mainly include (X)HTML, which is the markup language that started the Web, Cascading Style Sheets (CSS), which provides a mechanism for adding presentation style to Web pages, Scalable Vector Graphics (SVG), which can be used to create two-dimensional graphics in XML, etc. (Lie and Saarela 1999). Development in these technologies effect how people browse the Web, and how they author Web content. Therefore in any effort to support Web accessibility, it is crucial that features and limitations of these technologies are clearly stated. As part of the W3C's Interaction Domain, the Multimodal Interaction Working Group[8] seeks to extend the Web to allow users to choose an effective means to interact with Web applications through the modes of interaction best suited to their needs and device (visual, aural, and tactile). This kind of adaptation is key to Web standards, the rationale behind the activities focus on providing use cases and requirements analyses which are important resources for supporting Web accessibility.

---

[6] RDF, http://www.w3.org/RDF/

[7] Web Interaction Activity, http://www.w3.org/Interaction/

[8] Multimodal Interaction Group, http://www.w3.org/2002/mmi/

2.3 Adaptation and Coping – Key Components of Disabled Interaction

Some recent user studies suggest that disabled users develop strategies to cope with complex and inappropriately designed pages (Yesilada et al. 2007, Takagi et al. 2007), but it is not known how these strategies affect disabled users' interaction with Web pages and how guidelines can be extended to address these strategies. However, before we consider coping strategies as part of the Web page design paradigm or guidelines, we first need to understand the relationship between coping and adaptation processes. Adaptation is described as routine modes of getting along, and coping is related to those instances of adaptation that are particularly problematic, requiring new responses or special efforts (Zeidner and Endler 1996). Coping is further defined as 'constantly changing cognitive and behavioural efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of that person' (Lazarus and Folkman 1984, Lazarus 1993). Research on coping suggests that it typically involves some sort of stress and can be distinguished from other behaviours by occurring in stress situations (Zeidner and Endler 1996). Disabled Web users are in stress situations when they access complex pages with assistive technology (DRC). To overcome such stress situations, they employ coping strategies which refer to the specific efforts, both behavioural and psychological, that they employ to master, tolerate, reduce, or minimise stressful events (Lazarus 1966). Two general coping strategies have been distinguished: problem-solving strategies are efforts to do something active to alleviate stressful circumstances, whereas emotion-focused coping strategies involve efforts to regulate the emotional consequences of stressful or potentially stressful events.

In the design world, problem-solving coping strategies are also known as work-arounds or acts to employ unintended, non-obvious elements of a design in an effort to overcome the constraints of a physical and social environment (Norman 1988, 2004). Some studies show that disabled people develop work-arounds regarding everyday technology found in their homes, such as wristwatches and cell phones (Shinohara 2006). It seems evident, then, that Web interaction is highly influenced by the abilities of the users and the technology used to facilitate interaction. This technology, its use along with the guidelines that are often consulted in its development, drive Web accessibility especially at the design and build stage of the life cycle.

3 Discussion

The major problem we find is that there is a lack of scientific rigour to the current sets of guidelines. These guidelines, designed for the most part by well-meaning committees, did not have a wealth of scientific evidence when

designing them. Indeed, most guidelines are still without proper user studies and without scientific ratification. These guidelines were mostly created from anecdotal evidence and hearsay with some minor study results as the driving force. Indeed, guidelines have in some cases been used as a justification for prosecution, but when met, still do not produce an accessible Web site. While some work is being undertaken on this front, in retrospective validation (Watanabe 2007) if you will, there seems very little progress on the whole, with accessibility resources being directed into new areas such as Web 2.0 and the Semantic Web.

Web 2.0, is a mesh of enhanced semantics, push application widgets, and embedded scripting languages, and it was developed to pursue the promise of enhanced interactivity. While Web 2.0 will give a more in-depth treatise, we summarise that there is no precise definition of the Web 2.0, and in fact, there is some controversy surrounding definitions (White 2006). Today's Web is qualitatively different from the Web created a decade ago, and we can say that the term Web 2.0 is used to emphasise this evolution in a software-versioning style. As O'Reilly,[9] who coined the term, highlights 'there is no hard boundary for the definition of this term.' However, we can discuss Web 2.0 based on the following three aspects (Millard and Ross 2006): content, social (collective intelligence), and technologically.

In the Web 2.0, information is broken up into 'micro-content' units that can be distributed over different domains. As opposed to static (i.e., single-stream) pages, in Web 2.0 sites, pages aggregate and remix micro-content in different ways (i.e., multi-stream). These pages consume and remix data from multiple sources, a good example of this is Google Portal,[10] while providing their own data and services in a form that allows remixing by others (Webster et al. 2006). This creates network effects through an 'architecture of participation,' and goes beyond the page metaphor of the Web a decade ago to deliver rich user experiences. Technologies such as Web services and RSS feeds have contributed enormously towards developing such kind of aggregated contents.

The Web 2.0 is also seen as a combination of tools and sites that foster collaboration, sharing, and participation (Millen et al. 2005). The idea is that users are treated as co-developers, and the environment allows a harnessing of collective intelligence. Thus network effects from user contributions are key to this idea. Wikipedia, del.icio.us, Flickr, Amazon, Google, and Yahoo are good examples that make use of the collective intelligence to provide a variety of services.

The Web 2.0 is also used to refer to a family of technologies used to build dynamic and collaborative features of Web sites. These include technologies such as (i) AJAX that stands for 'asynchronous JavaScript and XML'

[9] What is Web 2.0: Design Patterns and Business Models for the Next Generation of Software, http://www.oreillynet.com/lpt/a/6228

[10] Google Portal, http://www.google.com/ig

(Gibson 2007) and incorporates XHML, CSS, DOM, XML, XSLT, and XMLHttpRequest; (ii) tag clouds or folksonomies,[11] and (iii) wikis.[12] Based on these three aspects, we can say that the Web 2.0 is not about serving and reading static pages, but it is a platform that allows collaboration, sharing, and usage of applications that used to traditionally run on desktops; these include online calendars (e.g., CalendarHub), productivity application suites (e.g., HyperOffice), e-mail and collaboration (e.g., Gmail), project management and personal organisers (e.g., Stikipad), and multimedia social software (e.g., Flickr, YouTube).

In this case, how do guidelines and best practice, conceived when the Web had just one operating modality (i.e., static), relate to new dynamic and highly interactive pages? Do we now need a new set of guidelines to address such changes on the Web? These questions are as yet unanswered. While we can predict that the possible benefits of Web 2.0 are great, it seems, however, that without timely and prompt action, disabled users will be barred from these benefits. Indeed, the use of Web 2.0 sites, as described above, will rapidly become 'off-limits' to disabled users. Semantic Web technologies (Semantic Web 19) have already shown themselves to be useful in addressing some issues of Web Accessibility. However, this new technology has not yet started to make its way into mainstream applications. Without change, will the benefits of the Semantic Web be lost? Will the promising enhanced interactivity of Web 2.0 technologies become increasingly inaccessible to disabled users? More importantly, how can we incorporate the requirements of these new technologies to the existing Web accessibility guidelines?

4 Future Directions

Understanding how a subject area will develop is notoriously risky, however, we can make some fairly sweeping predictions. First, we consider that the Web Content Accessibility Guidelines–Version 2 (WCAG 2.0) will be a major focus of effort in the future, especially with regard to testing algorithms and addition of scientific-based testing criteria. Secondly, we think there will be a strong case for guideline internationalisation. Thirdly, we believe that if unchecked, we will encounter 'guideline snow', a proliferation of many guidelines with no real way of checking and validating all. Finally, we believe that in the future, the luxury of expecting creators to know multiple guidelines and best practice will evaporate as the technologies, applications, and user devices they are used to create will be expanding exponentially.

---

[11] Folksonomy, http://del.icio.us/tag/folksonomy

[12] Wikis, en.wikipedia.org/wiki/Wiki (Zhang 2006)

4.1 Web Content Accessibility Guidelines (Version 2)

The WCAG 2.0 has taken around 5 years to develop mainly by a committee of specialists with public consultation under the aspics of the W3C. WCAG 2.0 covers a wide range of recommendations for making Web content more accessible. However, as the recommendations themselves state, the guidelines do not include standard usability recommendations except where they have a significantly greater impact on people with disabilities than on other people. These guidelines are mainly concerned with being testable and validateable, a major criticism of WCAG 1.0 guidelines. However, the authors acknowledge that even content that completely conforms to WCAG 2.0 may not be fully accessible to every person with a disability. Indeed, some user groups such as people with cognitive, language, and learning disabilities are not fully addressed by WCAG 2.0, either directly or through assistive technologies; and, there is a need for more research and development in these areas. The guidelines themselves reassert this need for user studies in concert with machine validation (see End User Evaluations):

> All WCAG 2.0 success criteria are testable. While some can be tested by computer programs, others must be tested by qualified human testers. Sometimes, a combination of computer programs and qualified human testers may be used. When people who understand WCAG 2.0 test the same content using the same success criteria, the same results should be obtained with high inter-rater reliability.

The testable nature of the guidelines is a marked difference and departure from WCAG 1.0 and permeates through all guidelines. Under each guideline, there are success criteria that describe specifically what must be achieved in order to conform to this standard. Each success criterion is written as a statement that is either true or false when Web content is tested against it. These success criteria are, like WCAG 1.0 guidelines, divided into three levels of conformance, single–A, double–A, and triple–A. However, the user-testing aspect is also covered as the guidelines require the same results to be obtained when people who understand how disabled users interact with Web content, test the same content. Indeed, WCAG 2.0 rests on four key principles:

> Anyone who wants to use the Web must have content that is: (1) Perceivable — Information and user interface components must be perceivable by users; (2) Operable — User interface components must be operable by users; (3) Understandable — Information and operation of user interface must be understandable by users; and (4) Robustness — Content must be robust enough that it can be interpreted reliably by a wide variety of user agents, including assistive technologies.

While these guidelines (and the fact there are only 12) all look straight forward on initial inspection, they are reasonably complicated and specific 'under the hood'. For instance, there are four supporting documents to consider when looking at a guideline. First, the quick reference, then the technical guideline document, next the 'Understanding WCAG 2.0' document, and finally the 'Techniques and Failures for WCAG 2.0' text. These complications have lead

to a number of designers and practitioners condemning WCAG 2.0 as impractical, and in some cases suggesting their own. The most vocal of these is Joe Clark:

> The Web Content Accessibility Guidelines 1.0 were published in 1999 and quickly grew out of date. The proposed new WCAG 2 is the result of five long years work by a Web Accessibility Initiative (WAI) committee that never quite got its act together. In an effort to be all things to all web content, the fundamentals of WCAG 2 are nearly impossible for a working standards-compliant developer to understand. WCAG 2 backtracks on basics of responsible web development that are well accepted by standardistas. WCAG 2 is not enough of an improvement and was not worth the wait. Joe clark
>
> 'To Hell with WCAG 2', A List Apart Magazine, May 23, 2006
> http://www.alistapart.com/articles/tohellwithwcag2

As research scientists, this controversy seems to be focused on the more practice-related areas of Web accessibility, however with enough support, the W3C Web Accessibility Initiative may be forced to rethink WCAG 2.0.

4.2 Internationalisation and Guideline Snow

Guidelines are meant to dovetail into accessible technology, for instance WCAG 1.0 checkpoint 10.5 states

> '10.5 Until user agents (including assistive technologies) render adjacent links distinctly, include non-link, printable characters (surrounded by spaces) between adjacent links. [Priority 3]'

In this case, the checkpoint is less focused on the content but more on the conformity of the user agent accessibility technology. Secondly, the guidelines have an imbedded cultural bias in that western north American and northern European society drive development of the guideline effort and therefore assumptions are made with regard to status, requirement, and preference. Indeed, when looking at guideline 10.5, the implicit assumption is this guideline will be met when tools developed in the English speaking world can render adjacent links distinctly. However, what about the capabilities of Japanese or Taiwanese screen readers (Watanabe and Umegaki 2006, Chen and Ho 2007)? What about user agents for different devices and what about devices used out of context? The WAI understands that this occurs but their solution is standards harmonisation:

> 'Harmonization of Web accessibility standards is key to making an accessible Web, because it creates a unified market for authoring tools that produce conformant content. This unified market in turn drives more rapid development of improved authoring tools. Improved authoring tools make it easier to create accessible Web sites, and to repair previously inaccessible sites; for instance, by prompting for accessibility information such as alternative text for graphics, captions for audio, or summaries for data tables. Widespread availability of improved authoring tools can enable accessible design to become the prevailing design mode even for Web developers only

> minimally aware of the rationale for Web accessibility, or disinclined to learn guidelines and techniques for accessibility.'

Which means conforming country-specific guidelines to the W3C guidelines. While this may seem practical, it does not account for cultural differences. While we can see that 'guideline snow' (having too many guidelines to make a decision as to site compliance or remain informed about the standards process) should be reduced, we must also build in flexibility for cultural specific guidelines.

It is not just country-specific legislatures which contribute to the proliferation of guidelines. Indeed, the W3C also contributes to guideline snow; it seems that with every new technology, a new set of conformance criteria and guidelines are created. Instead of creating specific addendums to a master set of guidelines to keep repetition and overload to a minimum, each W3C domain seems to need to create a new set of guidelines just for their area of concern.

4.3 Other Domains and Generalisation

The work undertaken in the Web accessibility field is not only for disabled people (Harper et al. 2004) but for organisations and people without disabilities also.[13] For instance, Mobile Web access suffers from interoperability and usability problems that make the Web difficult to use for most users (Harper and Patel 2005). With the move to small screen size, low bandwidth, and different operating modalities, all mobile device users effectively suffer the sensory and cognitive impairments normally only experienced by disabled users. W3Cs 'Mobile Web Initiative' (MWI)[14] proposes to address these issues through a concerted effort of key players in the Mobile production chain, including authoring tool vendors, content providers, handset manufacturers, browser vendors, and Mobile operators.

The current work in MWI focuses in two main areas: (i) developing 'best practices', which includes developing a set of technical best practices and associated materials in support of the development of Web sites that can be easily viewed and interacted with on Mobile devices and (ii) identifying device information required for content adaptation which includes the development of services that provide device descriptions in support of Web-enabled applications. Within the focus of the first area, the MWI proposes a new set of guidelines for realising mobile Web called the Mobile Web Best Practices (MWBP). Although these best practices have been partly derived from WCAG 1.0, they are still presented as separate guidelines. Therefore, if designers want to create a page which is accessible for both mobile and disabled users, they have to follow a number of different guidelines and validation tools which means it will be time consuming and costly.

---

[13] WAI Education and Outreach, http://www.w3.org/WAI/EO/

[14] Mobile Web Initiative, http://www.w3.org/2005/MWI/

We think migrating findings from accessibility research to the mobile Web is timely, and there is an opportunity to transfer lessons learnt and experiences gained to the Mobile Web which should not be missed. Indeed, there is great potential for reciprocity and interoperability between the mobile and accessible Webs, and many of the lessons learnt from the accessible Web will be relevant to the mobile Web. Accessibility practitioners have been researching, innovating, and building device-independent resources, in all but name, for many years; their expertise can, and should, be leveraged in efforts to develop the Mobile Web. Conversely, the Mobile Web is important from an accessibility standpoint, because the Mobile Web addresses many of the same issues, and is likely to be the focus of a significant research effort. We also think mobile Web is just an example domain that can benefit from the accessible Web research, there are many more and with the evolving Web, there will be more.

4.4 Everyone Editing

It is clear that the Web is returning to its origins; surfers are not just passive readers but content creators. Wikis allow open editing and access, blogs enable personal expression, Flicker, YouTube, MySpace, and Facebook encourage social networking by enabling designs to be 'created' and 'wrapped' around content. Indeed, it seems that only the Web infrastructure supporting expression is immutable and invisible to the user. Template-based tools such as iWeb, Google Page Creator, and RapidWeaver enable fast professional looking Web site creation using automated placement, with templates for blogging, picture sharing, and social networking; these tools often require publishing to a system-specific server, such as '.mac'.

The 'everyman' can now have a say but how do we prevent the appalling inaccessibility on the early Web without stifling creative freedom. Ordinary users do not (mostly) understand Web technologies, guidelines, or the needs of other user groups. How can we help everyone to understand 'the rules' (guidelines)? Do we need to create a simple set of guidelines, or indeed do we need guidelines to be supported by the authoring tools instead? Maybe guidelines are not the way forward and a path developing technologies to automatically crawl and fix these pages needs to be followed.

In this case, we wonder if the conjugation of authoring tools and user agents represents an opportunity for automatically generated Web accessibility or yet another problem for Web accessibility? Will form-based and highly graphical interfaces exclude disabled users from creation, expression, and social networking? What problems exist, what are the upcoming problems, what solutions are required? What about the accessibility of the content designed and created by surfers? Finally, what effect will this have on the wider Web? We pose the question: What happens when surfers become authors and designers?

5 Authors Opinion of the Field

Although the overall vision of these guidelines is good, the success of these guidelines can be discussed – according to the DRC report (DRC), most of the Web sites in their evaluation (81%) fail to satisfy the most basic WCAG 1.0 categories. Designers usually view these guidelines as irrelevant, too restrictive, or too time-consuming to implement. Moreover, as the DRC report (DRC) highlights designers have an inadequate understanding of the needs of disabled users and how to create accessible websites. For example, the Web has offered visually disabled people an unprecedented opportunity to have the same access to information as their sighted counterparts. However, not many designers or authors know or understand how visually disabled people access the Web and what needs to be done to create an accessible page. Furthermore, some studies show that the application of the guidelines is subject to interpretation; two designers applying the same set of guidelines to same set of pages generate different results (Ivory and Hearst 2001).

Disabled people represent around 10%–15% (estimate includes both registered and unregistered) of the European population. More than 82% of all people who are disabled are 50 years of age and older with these figures set to increase as the population ages. This ageing population will find that if the status quo is maintained, a great deal of the quality of their lives will be reduced as technology (such as the Web) becomes inaccessible to them. We see the problem as twofold; as the population ages, the requirement to work longer is increased but the ability to work long, as disability increases, is reduced. Apart from the ability to work, most people will also loose a communication lifeline when they can no longer use the Web; no more books from Amazon,[15] no more Webmail from the children, no more searching for family genealogy. We suggest that these issues must be addressed so that the major life activities of disabled people can be as unlimited as possible regardless of disability.

We suggest that people are disabled not by their impairment but are handicapped by the technology, infrastructure surrounding them, and the environment in which people are working in – this is also known as situationally induced impairments which typically occur temporarily (Sears and Young 2003). People are also handicapped in their efforts to find employment, to interact more fully with society at large, and to freely use technology without assistance. However, with the growth of the knowledge economy through Europe and other countries, and a move from manual work to more thought- and communication-based activities, there is the very real possibility of disabled people finding productive, fulfilling, and social empowering employment even later in life if only technology, and specifically the Web, were available to them.

Web accessibility not only will benefit those users whose access is currently hampered, but will potentially reduce the associated costs of providing

[15] Amazon, http://www.amazon.co.uk/

accessible content for information providers. With the additional introduction of legislation, providing supporting infrastructure to aid Web accessibility becomes increasingly important.

6 Conclusion

The Web plays an important role in many areas of our lives (e.g., education, employment, government, etc.) and as Thatcher et al. (2002) states 'an accessible Web that allows people with disabilities to actively participate in society is essential for equal opportunities in many areas'. In this chapter, we have given a broad overview of the Web accessibility field which aims to provide equal opportunities to everyone, described a number of guidelines that are designed to ensure accessibility on the Web and discussed a number of areas that we think will become more important in the future. Given the speed at which the Web evolves, it can be anticipated that many other guidelines will be developed or will need to be developed and made available to the accessibility community. Therefore, it is our hope that this chapter will help future scientists learn from our mistakes.

In conclusion, although the guidelines are useful, they are only part of the overall process of supporting Web accessibility (see Specialized Browsers). Our review of the 'Web accessibility' concludes that disabled people have difficulties accessing the Web, either because of the inappropriately designed Web pages or because of the insufficiency of currently available technologies. This lack of accessibility leads to poor interaction and lack of understanding of disabled users which forces them to cope with interaction methodologies that are inappropriate.

References

Andrew Sears and Mark Young. *Physical disabilities and computing technologies: An analysis of impairments*. pp. 482–503, 2003.

A Report Into Key Government Web Sites. Interactive Bureau, UK, 2002. ISBN 978-0954720445. http://www.iablondon.com/.

Bebo White. The implications of web 2.0 on web information system. In *WEBIST*, Portugal, 2006.

Becky Gibson. Enabling an accessible web 2.0. In *W4A '07: Proceedings of the 2007 international cross-disciplinary conference on Web accessibility (W4A)*, pp. 1–6. ACM Press, 2007. doi: http://doi.acm.org/10.1145/1243441.1243442.

Brian Kelly. Webwatch: An accessibility analysis of UK university entry points. Technical report, The University of Bath- Ariadne Issue 33, 2002. http://www.ariadne.ac.uk/issue33/web-watch/.

Carole Goble, Simon Harper, and Robert Stevens. The travails of visually impaired web travellers. In *HT? 00*, pp. 1–10. ACM Press, 2000.

David E. Millard and Martin Ross. Web 2.0: hypertext by any other name? In *HYPERTEXT '06: Proceedings of the seventeenth conference on Hypertext and hypermedia*, pp. 27–30. ACM Press, 2006. doi: http://doi.acm.org/10.1145/1149941.1149947.

David Millen, Jonathan Feinberg, and Bernard Kerr. Social bookmarking in the enterprise. *Queue*, 3(9):28–35, 2005. ISSN 1542-7730. doi: http://doi.acm.org/10.1145/1105664.1105676.

Disability Rights Commission (DRC). The web: Access and inclusion for disabled people. Technical report, Disability Rights Commission (DRC), UK, 2004.

David Webster, Weihong Huang, Darren Mundy, and Paul Warren. Context-orientated news riltering for web 2.0 and beyond. In WWW '06: Proceedings of the 15th international conference on World Wide Web, pp. 1001–1002, New York, NY, USA, 2006. ACM Press. ISBN 1-59593-323-9. doi: http://doi.acm.org/10.1145/1135777.1135985.

Donald A. Norman. *The Design of Everyday Things*. MIT Press, 1988.

Donald A. Norman. *Emotional Design – Why We Love (or Hate) Everyday Things*. Basic Books, 2004.

eAccessibility of Public Sector Services in the European Union. European union policy survey, UK Government Cabinet Office, November 2005. URL http://www.cabinetoffice.gov.uk/e-government/resources/eaccessibility/index.asp.

Engin Kirda. Web engineering device independent web services. In *ICSE '01: Proceedings of the 23rd International Conference on Software Engineering*, pp. 795–796, Washington, DC, USA, 2001. IEEE Computer Society.

Haakon Wium Lie and Janne Saarela. Multipurpose Web publishing using HTML, XML, and CSS. *Commun. ACM*, 42(10):95–101, 1999. doi: http://doi.acm.org/10.1145/317665.317681.

Hironobu Takagi, Shin Saito, Kentarou Fukuda, and Chieko Asakawa. Analysis of navigability of web applications for improving blind usability. *ACM Trans. Comput.-Hum. Interact.*, 14(3):13, 2007.

Jenny Craven and Peter Brophy. Non-visual access to the digital library: the use of digital library interfaces by blind and visually impaired people, 2003. Library and Information Commission Research Report 145.

Jim Thatcher, Cynthia Waddell, Shawn Henry, Sarah Swierenga, Mark Urban, Michael Burks, Bob Regan, and Paul Bohman. *Constructing Accessible Web Sites*. Glasshaus, 2002. ISBN 1904151000.

Jon Gunderson and Ian Jacobs. User agent accessibility guidelines 1.0. W3C, 1999. http://www.w3.org/TR/WAI-USERAGENT/.

Jutta Treviranus, Charles McCathieNevile, Ian Jacobs, and Jan Richards. *Authoring tool accessibility guidelines 1.0. W3C*, 2000. http://www.w3.org/TR/ATAG10/.

Kara Pernice Coyne and Jakob Nielsen. Beyond ALT text: Making the web easy to use for users with disabilities. Nielson Norman Group, 2001.

Kristen Shinohara. Designing assistive technology for blind users. In *ASSETS'06*, 2006.

Melody Ivory and Marti Hearst. The state of the art in automating usability evaluation of user interfaces. *ACM Computer Survey*, 33(4):470–516, 2001.

Michael Paciello. *Web accessibility for people with disabilities*. CMP books, CMP media LLC, 2000. ISBN 1-929629-08-7.

Moshe Zeidner and Norman S. Endler, editors. *Handbook of coping: theory, research, applications*. John Wiley and Sons, 1996.

Richard S. Lazarus. *Psychological Stress and the Coping Process*. McGraw-Hill, 1966.

Richard S. Lazarus. Coping theory and research: Past, present and future. *Psychosomatic Medicine*, 55:234–247, 1993.

Richard S. Lazarus and Susan Folkman. *Stress, Appraisal and Coping*. Springer Publishing Company, 1984.

Simon Harper and Neha Patel. Gist summaries for visually impaired surfers. In *Assets '05: Proceedings of the 7th international ACM SIGACCESS conference on Computers and accessibility*, pp. 90–97. ACM Press, 2005.

Simon Harper and Sean Bechhofer. Semantic triage for increased accessibility. *IBM* Systems Journal, 44(3), 2005.

Simon Harper, Yeliz Yesilada, Carole Goble, and Robert Stevens. How much is too much in a hypertext link?: Investigating context and preview – a formative evaluation. In *Proceedings of the fifteenth ACM conference on Hypertext & hypermedia*, pp. 116–125, 2004. doi: http://dx.doi.org/10.1145/1012807.1012843.

Takayuki Watanabe. Experimental evaluation of usability and accessibility of heading elements. In *W4A '07*, pp. 157–164. ACM Press, 2007. doi: http://doi.acm.org/10.1145/1243441.1243473.

Takayuki Watanabe and Masahiro Umegaki. Capability survey of japanese user agents and its impact on web accessibility. In *W4A: Proceedings of the 2006 international cross-disciplinary workshop on Web accessibility (W4A)*, pp. 38–48. ACM Press, 2006. doi: http://doi.acm.org/10.1145/1133219.1133227.

Terry Sullivan and Rebecca Matson. Barriers to use: usability and content accessibility on the web's most popular sites. In *Proceedings of the 2000 conference on Universal Usability*, pp. 139–144, 2000. ISBN 1-58113-314-6.

Walter Dees. Handling device diversity through multi-level stylesheets. In *IUI '04: Proceedings of the 9th international conference on Intelligent user interfaces*, pp. 229–231. ACM Press, 2004. doi: http://doi.acm.org/10.1145/964442.964488.

Wendy A. Chisholm and Shawn Lawton Henry. Interdependent components of web accessibility. In *W4A '05: Proceedings of the 2005 International Cross-Disciplinary Workshop on Web Accessibility (W4A)*, pp. 31–37. ACM Press, 2005.

Wendy Chisholm, Gregg Vanderheiden, and Ian Jacobs. Web content accessibility guidelines 1.0.W3C, 1999. http://www.w3.org/TR/WAI-WEBCONTENT/.

Yeliz Yesilada, Robert Stevens, Simon Harper, and Carole Goble. Evaluating DANTE: Semantic transcoding for visually disabled users. *ACM Trans. Comput.-Hum. Interact.*, 14(3):14, 2007. doi: http://doi.acm.org/10.1145/1279700.1279704.

Yeliz Yesilada, Simon Harper, Carole Goble, and Robert Stevens. Screen readers cannot see (ontology based semantic annotation for visually impaired web travellers). In *Proceedings of the International Conference on Web Engineering (ICWE)*, pp. 445–458. Springer, 2004. doi: http://dx.doi.org/10.1007/b99180.

Yuejiao Zhang. Wiki means more: hyperreading in wikipedia. In *HYPERTEXT '06: Proceedings of the seventeenth conference on Hypertext and hypermedia*, pp. 23–26. ACM Press, 2006. doi: http://doi.acm.org/10.1145/1149941.1149946.

Yui-Liang Chen and Yung-Yu Ho. The status of using 'big eye' chinese screen reader on 'wretch' blog in taiwan. In *W4A '07: Proceedings of the 2007 international cross-disciplinary conference on Web accessibility (W4A)*, pp. 134–135. ACM Press, 2007. doi: http://doi.acm.org/10.1145/1243441.1243447.